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AUTO-INFECTION.*

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Semmelweiss,[1] the father of modern antiseptic midwifery, stated, nearly forty years ago, that "the decomposed organic animal material which causes childbed fever when absorbed, in the vast majority of cases is brought to the individual from without. These are the cases which represent the epidemic of childbed fever; these are the cases which can be prevented." The view thus enunciated is substantially that which is held to-day, if for "decomposing animal matter" be substituted "pus-producing micro-organisms." The study of these germs in connection with suppurative processes and septic disturbances has shown that puerperal diseases are not to be classed as different and separate affections. The micro-organisms are the same that cause sepsis elsewhere, and the obstetrician, as well as the surgeon has to deal with wound infection. Preliminary to the consideration of auto-infection, a hurried mention of the bacteria found in puerperal sepsis[2] seems necessary. As in wound infection the streptococcus pyogenes is present in the severer forms, but the staphylococcus aureus, as in other parts of the body, may cause infection.

Döberlein,[3] in 1887, reported an epidemic of puerperal fever in Leipsic, in which streptococci and staphylococci were combined. The organisms of putrefaction, not so much as pus-producers as from the absorption of the resulting poisonous ptomaines are thought to give rise to puerperal affections. Matthews Duncan has applied the term *sapræmia* to this class of cases, but Bumm[4] and von Franque[5] claim it is rare, they having found streptococci in the lochiæ of cases considered clinically typical ones of sapræmia. Gonococci have been found by Krönig[6] in pure cultures from the secretion of a number of cases in which slight fever existed during the puerperium. In four cases under my care, in which there were pain, fever and a muco-purulent discharge, although no examination for gonococci was

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made, my suspicions were confirmed by the presence of gonorrhœa in the husband. Von Franque[5] has reported a mild case of puerperal infection in which he made a pure culture of the colon bacillus, and Heyse[7] found in a case of puerperal tetanus the bacilli of tetanus. It will thus be seen that a variety of micro-organisms may produce puerperal infection, and it will not be doubted that in a large majority of cases they are carried into the genital tract on the hands or instruments of the accoucheur and he, as said before deals with wound infection.

The most important question which has been discussed for some time is whether this is the only cause of infection, or if infection may come from organisms present in the genital canal or uterus previous to examination. In other words, is infection always the fault of the attendant, or sometimes the result of poison previously introduced? Semmelweiss recognized so-called auto-infection in the following statement: "In rare cases the decomposed organic animal material which causes childbed fever when absorbed is produced within the borders of the affected organism; these are the cases of auto-infection and can not all be prevented."

Strictly speaking, auto-infection as conceived by him and others is impossible. The supporters of auto-infection to-day believe that, in a small percentage of the cases of puerperal fever, the pathogenic organisms having been introduced into the birth-canal during pregnancy, remain in a latent state until confinement, and being absorbed in the wounds following labor cause septic poisoning, this being simply a variety of external infection. The opponents deny the existence of infection from this source, and attribute all cases of infection to the introduction of germs from without by careless attendants during labor. The upholders of either side of this question agree as to the value of thorough external disinfection, but the auto-infectionists claim that better results are attained by the addition of judicious internal disinfection before and after labor. Many arguments have been brought forward by the supporters of these views. Before a bacteriological study of the genital secretions was made, it was observed that the measures used by surgeons to prevent wound infection were not so successful in puerperal cases. The proof of auto-infection must rest in the presence of pus-producing organisms in the secretions of the birth-canal in pregnant women not previously examined.

The results of the earlier investigations were often contradictory. Kehrer[8] and Karewski[9] found in the lochia of healthy women substances which, when injected into animals, produced suppuration. They therefore concluded that a woman might infect herself.

Gönnor,[10] who is supported by Thomen [14] and Samschin,[15] noted the absence of pathogenic organisms in the cervix and vaginal secretions of thirty-one pregnant women—the organisms found were harmless, and there was no danger from auto-infection.

Döberlein obtained the lochia from the uterus, and in febrile cases he found streptococci, but not in non-febrile cases.

The following year (1888) Winter [11] confirmed the observations of Döberlein. He cultivated streptococci and staphylococci from the vaginal secretions of non-pregnant women, but they were absent from the uterus, and he concluded, with Döberlein, that auto-infection is possible.

Ott [12] also substantiated the work of Döberlein and Winter. Czerniewski [13] found virulent streptococci in the lochia of fifty-seven puerperal cases with fever, but in only one of seventy-seven non-febrile ones.

Steffeck [17] reports the presence of pus-producing micro-organisms in forty-one per cent. of the twenty-nine pregnant women examined, as was verified by the inoculation of animals.

Burgubura [16] examined twelve healthy, untouched pregnant women. In two cases he found staphylococci, in one streptococci, and he believes one must attach importance to the secretions.

Döberlein,[18] in his book on vaginal secretions, attempts to explain the apparently different results of good observers. His work comprises the examination of a hundred and ninety-five cases, from which he notes the following differences between a normal and a pathological secretion. The normal is a whitish material, of the consistence of clotted milk, and has a decided acid reaction It contains a long bacillus, epithelial cells and a few yeast cells. The pathological secretion is of a yellowish or green color, weakly acid, neutral or alkaline reaction. He also found it to contain bacilli, cocci, epithelial cells and leucocytes. Of those examined 55.3 per cent. were normal and 44.6 per cent. pathological. In ten per cent. of the latter he found the streptococcus pyogenes, which proved pathogenic in one half the cases inoculated.

Williams [19] substantiates the results of Döberlein in a report of the examination of fifteen pregnant women. In four cases normal secretions were found, in two cases vaginal bacilli and unidentified cocci, in one case no growth appeared on media, in eight cases pus-producing micro-organisms were found, three of which contained streptococci, and the reaction was altered as noted by Döberlein. Inoculation experiments gave negative results.

On the other hand Krönig has this year published the report of

one hundred aseptic women at the period of labor. He found the streptococci most frequently, and but seldom staphylococci. After considering the reaction of the vaginal secretion which in three hundred pregnant women he found to be distinctly acid, he concludes that in pathological conditions the secretions attain a much higher degree of acidity, so that the streptococcus could not thrive therein; at least he was unable to obtain cultures of this germ. The author further concludes that the vaginal secretions of untouched pregnant women contain nothing aseptic, the thrush and gonococcus germ excepted, and such vaginæ are therefore aseptic.

He considers vaginal injections of antiseptics dangerous in the ordinary patient as they may lessen chemically the resistance of tissues to bacteria, and increase the intensity of septic endometritis by washing bacteria into the uterine cavity. Döberlein,[21] who is a distinguished pathologist as well as obstetrician, in the same journal reviews the work of Krönig, and questions the reliability of his tests for alkalinity as well as his culture media. He offsets the investigations of Krönig by his own as confirmed by Williams of Johns Hopkins and Burgubura, and cites Burkhardt's recent and most careful investigations made at the request of Fehling on material at the Basle clinic.

Out of one hundred and sixteen pregnant women examined, sixty-nine, or fifty-nine per cent., had the normal acid milk-white secretion described by Döberlein. In thirty-two cases he found pathological secretions. In twenty-seven per cent. the secretions were of a dirty yellow color, feebly acid, neutral or alkaline reaction, and contained leucocytes and pathogenic bacteria. In five, or 4.3 per cent. he found streptococci, four per cent. being the percentage Döberlein observed. Out of forty-four cases with normal secretions, 22.7 per cent. had abnormal puerperium, while of twenty-six cases with pathological secretions, 57.7 per cent. had trouble. He concludes that the difference between normal and pathological vaginal secretions is of the greatest importance, and the latter must be combated by thorough prophylactic disinfection.

On the above authority we may safely conclude that pathogenic organisms are found in the birth-canal of a decided percentage of women who have not been previously examined; in other words auto-infection is possible. The frequency of these organisms in the vaginal secretions is out of all proportion to the number of cases of childbed fever, and other conditions favoring development, not yet ascertained, must be looked for. I wish to refer briefly to a case bearing on the subject of auto-infection, reported at the June meeting of this Society.[31]

The septic chill developed five hours after delivery. Death occurred on the tenth day—septic arthritis having appeared on the sixth. The child was ill in twelve hours after birth. Septic arthritis developed on the third day and death on the sixth. The previous condition of the mother and the disease of the endometrium after delivery, together with the rapid development of septicæmia in mother and child point to previous infection. Haven has recently reported a case of puerperal sepsis (*Boston Med. and Surg. Jour.*, February 8, 1894) in which the chill took place twelve hours after labor. He believes the woman was in a septic condition at the time, as shown by the rapid development of the disease. The colon bacillus was found to be the cause.

At the height of the antiseptic wave, both internal and external disinfection of puerperal women were carried to such extremes that they became burdensome and even injurious. One French writer (quoted by Garrigues [22]) went so far in his antiseptic zeal, as to require bichloride injections for four weeks before delivery. The last two weeks they were given every other day, and the vagina tamponed with iodoform gauze. Mermann [23] has reported nine hundred cases of labor with but one death, and that the result of rupture of the uterus. He practices only subjective antisepsis, and found that the fever cases were reduced from twenty-one to six per cent. since the discontinuance of the vaginal douche. He concludes that painstaking antiseptic measures applied to external parts gives a mortality practically *nil.* Leopold and Goldberg plead for the restriction of vaginal examinations to abnormal cases, depending upon abdominal palpation, and would limit the vaginal douche to operative cases. In normal cases their tables show that where no vaginal douches were used the puerperium was best.

On the other hand, Price, of Preston Retreat, Philadelphia, had to January 1, 1894, over thirteen hundred cases of labor without a death from sepsis. He requires thorough external disinfection, and a single bichloride vaginal douche before and after delivery.

Boyd, of the Philadelphia Lying-in Charity, tells me that in one thousand cases they have had but five deaths—none from sepsis. A hot bath of soap and water, evacuation of the bowels by means of injection of soap and water, and a bichloride douche before and after delivery comprise the disinfection. These results are especially good for a teaching maternity, where over two hundred and fifty students have been taught during this period.

Garrigues [22] of the New York Maternity, uses practically the same prophylactic measures. Five years prior to January 1, 1891,

there were 3,170 deliveries with thirty deaths; seven succumbed to sepsis, being less than one fifth of one per cent. McLane[25] of Sloane Maternity, reports one thousand consecutive cases with six deaths, one from sepsis, or one tenth of one per cent.

Frommell[26] believes in an internal injection of bichloride as a prophylaxis of puerperal disease. He finds no increase of sepsis from frequent examination by students in his clinic when this precaution is taken. When he relied on external disinfection puerperal infection occurred.

C. Godson[27] of London, refers to the improvement in the mortality of his hospital. From January, 1880, to January, 1884, it was over three per cent. In the six years from January, 1887, to January, 1893, the mortality was three tenths of one per cent. Every parturient patient received a vaginal douche (1 to 2,000 sublimate), and a second at the termination of labor.

Hoffmier[28] advocates the disinfection of the birth-canal before delivery, and shows from the comparison of statistics of the Würzburg clinic with those of others that it is not a source of danger to the mother, but, on the contrary, even with the examination of students, it diminishes puerperal disease.

Eberhart[29] of Cologne says the preliminary vaginal douche, which he employed while assistant in the Kaltenbach clinic, he still uses in the hospital and in private practice with the best results.

It would seem from the results of Mermann, Leopold and Krönig, that pathogenic organisms do not play as important a part in the infection of puerperal cases as we would expect from the bacteriological investigations recorded.

But this is common with wound infection as seen by the surgeon. The mere presence of these germs does not mean a septic wound. This has been clearly shown by Welch and Howard,[30] who introduced, without suppuration, virulent cultures of staphylococcus aureus into blood-clots of wounds that had been treated antiseptically.

As suggested by Williams, it is possible that certain conditions are necessary for the production of infection of which we are ignorant—that certain products are wanting in these organisms in the vagina that those introduced from without possess. He also calls attention to the fact that the mechanism of labor, comprising the gush of amniotic fluid, passage of the closely fitting child, the flow of blood and the removal of the placenta, is admirably adapted to cleaning out the genital tract. This doubtless explains partially the comparative infrequency of infection from pathological secretions.

The routine use of the single ante-partum and post-partum vaginal douche is certainly not harmful, as shown by the remarkable results in the lying-in institutions herein referred to.

In so far as it leads to careless external disinfection of patient and attendants it is capable of doing harm both in hospital and private practice, for it is better to have thorough external antisepsis without internal disinfection, than to have thorough internal with neglected external measures.

Notwithstanding the unusual statistics of Leopold and Merrmann, it is the opinion of the writer that the weight of evidence, both from a clinical and theoretical standpoint, favors judicious internal disinfection particularly in hospital practice. In private practice where the secretion is known to be pathological, or where there is a suspicion of gonorrhœa, as well as in instrumental deliveries, the vaginal douche before and after delivery should be used. In normal cases, where ordinary cleanliness exists, the best results will probably be obtained from thorough external disinfection, at least the vaginal douche is unnecessary.

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